These corrections are Super! Nice job!

Superdupercorrection Form Name:

#__1__ Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original __3__/4 Supercorrection __4__/4

#1 is a true or false question and I got a, ~~c~~ e, and f wrong. The rules for the problemse were $a>0$, $a\neq1$, $x>0$ and $y>0$. In 1a I put false but the answer is true because if you put 2 into the value A then $\log_2 2=1$ which is $2^1=2$ which is a true statement. 1c I wrote true but it is false since $\log_a 0=1$ exponentially equals $a^1=0$ and the only value of a that will make the value 0 is 0, but $a>0$ and therefore the answer is false. Nice #1e I put false but it is actually true. $\log_a xy=\log_a x+\log_a y$ is a problem dealing with log addition. If you solve through the equation you get $\log_a x+\log_a y$. you can put any positive # in the equation which makes #1e true. My last error was in 1f where

Correct solution: I said true insted of false. It is false because $\log_a(x+y)$ does not equal $\log_a x+\log_a y$. Another way to prove these would be by explaining by comparing to the logarithmic propertys. In this case, if the answer was a logarithmic property it would be true but if not it would be false. So 1a is true because it is logarithmic property 2 and 1e is true because it logarithmic property 5. The other to are not logarithmic property's so they are false. Everything we learned about log propertys was in section 11.3 on pages 487–489. Good!

correct solution

1a $\log_a a=1$

$a^1=a$

$a=7$

$7^1=7$ ✓

True because it can be solved with any positive number

1c $\log_a 0=1$

$a^1=0$

a must equal 0, but $a>0$ so 1c is false. ✓

1e $\log_a xy=\log_a x+\log_a y$

$\log_a xy=\log_a xy$

$x=2$ $y=3$

$\log_a 6=\log_a 6$

which is true because it can be solved with any positive #.

Reasoning here is a little circular...

1f $\log_a(x+y)=\log_a y+\log_a x$

$\log_a(x+y)=\log_a yx$

$x=3$ $y=3$ $\log_a(3+3)=\log_a 3\cdot3$ which is a false statement. ✓

Superdupercorrection Form **Name:**

#_3_ Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original _3_/4 Supercorrection _4_/4

for #3 my error was I forgot to derive the positive constant of K first, before finishing the answer. To find K you set the 400 bacteria at time 0 as B_0 in the equation $B = B_0 e^{kt}$, 900 in bacteria B and 4 in t for that is the time at which there are 900 bacteria. after plugging in the values your equation will be $900 = 400^{4k}$ and after solving you will find that $K = \frac{\ln 9/4}{4}$. Then to find the # of bacteria at 12 hours you set up the problem $B = 400e^{k12}$ where K equals $\frac{\ln 9/4}{4}$. For the answer you will get 4556 Which proves there are not 1900 bacteria after 12 hours. This problem is almost straight from the book and worked with many problems like this in section 11.5.

Correct solution:

Excellent!

$400 = b_0$

$B = 900$

$900 = 400e^{4k}$

$9/4 = e^{4k}$

$\frac{\ln 9/4}{4} = k$

$B = 400e^{12 \frac{\ln 9/4}{4}}$

$\boxed{B = 4556}$

No

Supercorrection Four-Point Form $x = 12.5754\ 19646$ Name: ____________

2 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.
Original 4/4 Supercorrection 4/4

For #2 my answer was very close. I derived this answer through a process of guessing and checking, when in reality there is a considerably easier way of solving it. Take the exponential equation of $3^x \geq 1{,}000{,}000$ and turn it into a logarithm, $\log_3 1{,}000{,}000$. This equals 6 divided by log 3. Put it into your calculator and you get 12.57541965. But this is not the full answer because $\log_3 1{,}000{,}000$

Correct solution: its an ~~irregular~~ irrational # like pi and therefore can always be smaller.

$3^x \geq 1{,}000{,}000$

only approximate...

$\log_3 1{,}000{,}000 = x$

6 why?

$\frac{6}{\log 3} \approx 12.5754\ 1965$ on calculator

or leave it as $x = \frac{6}{\log 3}$

4 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.
Original 2/4 Supercorrection 4/4

In #4 I got part A right but part B wrong. Firstly the error in the incorrect solution was $\ln 100 = \ln 18 \ln(e^{4k})$ not $\frac{\ln 100}{4 \ln 18} = k$ because when you apply a natural log to both sides of an equation it can only be applyed to one value. To continue from $\ln 100 = \ln(18e^{4k})$ you divide 18 from both sides and then solve starting with $\frac{100}{18} = e^{4k}$. We have worked with similar problems

You could continue from here...

Correct solution: relating to natural logarithms starting with section 11.2.

$100 = 18e^{4k}$

$\frac{100}{18} = e^{4k}$

$\ln \frac{100}{18} = \ln e^{4k}$

$\frac{\ln \frac{100}{18}}{4} = \frac{4k}{4}$

$k = \frac{\ln \frac{100}{18}}{4}$

$\boxed{k = .429}$

Supercorrection Four-Point Form Name:

6 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original 0 /4 Supercorrection 4 /4

I left #6 fully blank, #6 is a problem that tests ones knowledge of the properties of logarithms. your equation is $\log \frac{100\sqrt{y}}{x^2}$. First you distribute the log to all other values. When you do this you get $\frac{\log 100 + \log\sqrt{y}}{\log x^2}$. We then must bring $\log x^2$ up to the top of the equation because the logarithm property says when log is distributed to a denominator it is brought up as a negative # which gives you $\log 100 + \log\sqrt{y} - \log x^2$.

Argh! No!!

Correct solution:

then you simplify down to $2 + \frac{1}{2}\log y - 2\log x$. This problem relates mainly to the logarithm property which we learned in 11.3.

$$\log \frac{100\sqrt{y}}{x^2} =$$

$$\log 100 + \log\sqrt{y} - \log x^2 =$$

$$2 + \tfrac{1}{2}\log\sqrt{y} - 2\log x.$$

How

7 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original 0 /4 Supercorrection 4 /4

Problem 7 I also left blank and is essentially #6 but being done in reverse. The problem also relates to the logarithmic property. Basically all that must be done in this problem is put the equation into one single value. to do this you first set the problem so it is being multiplied by ln and then reverse the equation. We have worked with similar problems including #10 on page 491 ✓

Correct solution:

$$\ln 3 + \tfrac{1}{3}\ln(4-x^2) - \ln x =$$

$$\ln \frac{3\sqrt[3]{4-x^2}}{x}$$

Needs a little more justification.

Superdupercorrection Form Name

\# 8 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original 3 /4 Supercorrection 4 /4

I was almost right with my solution for #8. My error was I put $x \geq 3.5$ instead of $x > 3.5$. Also my way of solving the problem was mathematicly unethical. #8 gives you a function that you must find the INV of. To solve start by switching x and y as you do w/ all logarithms and then continue from there. My solution was correct until about halfway through where I made the error of applying ln to 2 values instead of one single quantity. We have worked with equations before in class during notes, where you told us we would have an inverse of logarithms question on our test!! :)

Correct solution:

$$y = \frac{e^x + 7}{2}$$

$$x = \frac{e^y + 7}{2} \times 2$$

$$2x = e^y + 7$$

$$-7 \qquad -7$$

$$e^y = 2x - 7$$

$$\ln e^y = \ln(2x - 7)$$

$$y = \ln(2x - 7)$$

$$\text{INV } f(x) = \ln(2x - 7)$$

The Domain would be $2x - 7 > 0$

and there fore $x = 3.5$

making the range $\boxed{f(x) > 3.5}$

266 6334

Superdupercorrection Form Name:

\# 9 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.
Original 1 /4 Supercorrection 4 /4

I had no Idea what I was doing on this problem during the test. However, after supercorrecting and reading 11.1 in the book it shows us that any logarithm with a fractional base will have a negative answer as long as it is accompanied with a positive # in the place of a in $\log_b a$. As long as you know this fundamental concept you can solve #9. The reason why a fractional exponent will ~~be~~ negative is because an equation such as $\log_{\frac{1}{4}} 2 = x$ is written $\frac{1}{4}^x = 2$ exponentially. The only way to get the denominator to the top of the equation is by using a negative exponent, which in this case is $-\frac{1}{2}$. We learned and practiced this concept in Section 11.1.

Correct solution:

$$\log_{\frac{1}{4}} 2 = x$$

$$\frac{1}{4}^x = 2$$

$$(4^{-1})^u = 2$$

$$4^{-u} = 2^1$$

$$u = -\frac{1}{2}$$

So $\boxed{a = 2,\ b = \frac{1}{4}}$

Supercorrection Four-Point Form Name:__________

10 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.
Original 2 /4 Supercorrection 4 /4

My error in # had to do with me not knowing the rules of logarithms, When to logarithms are being added together you don't actually add you multiply. For exampe $\log_a x + \log_a y = \log_a xy$. This rule is a ~~called the~~ logarithmic property. After you have completed the addition of the logarithms, you bring the whole equation over to one side and continue as though it were a quadratic equation. We have worked with the addition of logs before including on question 10 page 491.

Correct solution:

$$\log_a x + \log_a(x-2) = \log_a(x+4) \qquad \boxed{x=4}$$

$$\log_a(x^2-2x) = \log_a(x+4)$$

$$x^2-2x = x+4$$

$$-x \quad -4 \quad -x \quad -4$$

$$x^2-3x-4=0$$

$$(x-4)(x+1)$$

$$x = \cancel{-1} \text{ or } 4$$

why?

13 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.
Original 3 /4 Supercorrection 4 /4

For #13 I got parts A + B right but part C wrong. The question in part C is "What is the relationship between the functions g and h." On the test I said the were related because both functions equal x which is true, but the real answer is that they are inverses ~~of~~ each other. We know because property 3 and 4 of logarithms are INV of each other, g(h(x)) being

Correct solution:

property 3 and h(g(x)) being property 4. We also know that when dealing with functions that g(h(x)) and h(g(x)) both equal x if they are inverses, which they do.

$g(h(x)) = \log_7 7^x$

$\log_7 7^x$ is property 3 so

$g(h(x)) = \log_a a^x$

$$\boxed{\begin{array}{l}\log_7 7^x = x \\ 7^{\log_7 x} = x\end{array}}$$

$h(g(x)) = 7^{\log_7 x}$

$7^{\log_7 x}$ is property 4 so

$h(g(x)) = a^{\log_a x}$

We know that $g(x) = \log_a x$ and $h(x) = a^x$ so then....

$\log_7 7^x = 7^{\log_7 x}$ which both equal x.

They are inverses

Good!!

Supercorrection Four-Point Form

Name:

#11 Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original 0 /4 Supercorrection 4 /4

I left 11 blank on the test but it isn't that hard of a problem, as long as you know how to apply your property's. 11a has to do with property's 6+7 that together make it possible to bring the denominator to the front of an equation. 11b is just about property 8 or the base change formula that makes it possible to change an equation by simply dividing by a log. 11c has to do with property 5 that shows how to seperate logs of a single product. The two questions from the book that are

Correct solution: most like the three problem are #32 and 34 on page 492

$\log_a \frac{1}{b^2}$

$\log_a b^{-2}$

$-2\log_a b$

$-2(2.3219)$

$\boxed{-4.6438}$

Careful!

$\log_b a$

change of base

$\frac{\log_a a}{\log_a b}$

$\log_a a \Rightarrow a = a$

$\boxed{\frac{1}{2.3219}}$

$\log_a ab = \log_a b + \log_a a$

$\log_a ab = 1 + 2.3219$

$\log_a ab = \boxed{3.3219}$

#______Convince me that you now understand the concept- connect to previous HW, notes, etc. Be sure to also explain the error(s) that you made.

Original ____/4 Supercorrection____/4

Correct solution:

ALGEBRA 2 HON $\frac{73}{104}$ = 70% [redacted] - I know your [redacted] test will be much better! Name: [redacted]

A Finely Crafted O'Brien Unit 5 Test

Calculator Section: You may use a calculator. Show all work and circle your answer. Use your time wisely; you will be able to earn additional credit after the timed portion of the test by completing Supercorrections. When you finish, put away your calculator and you come up to get the non-calculator part- you may continue to work on both sections without your calculator.

6

1. In the following statements, $a > 0$, $a \neq 1$ and $x > 0$, $y > 0$. Determine whether each is true or false.

3/4

a. $\log_a a = 1$ $a^1 = a$ T
False

b. $\log_a 1 = a$
$a^a = 1$ False

c. $\log_a 0 = 1$
True F

d. $\log_a 1 = 0$
$a^0 = 1$ True

e. $\log_a xy = \log_a x + \log_a y$ T
false

f. $\log_a (x+y) = \log_a x + \log_a y$
True F

g. $\log_a (x+y) = \log_a x \cdot \log_a y$
false

h. $\log_a xy = \log_a x \cdot \log_a y$
false

i. $\log_a x^y = y \log_a x$
True

j. $\log_a x^y = (\log_a x)^y$
false

8

2. Find the smallest value of x for which $3^x \geq 1{,}000{,}000$.

12.57541964581 = 1,000,000

$x = 12.5754196461$

12.57541965

So close!

3/4

$\log_3 1{,}000{,}000 = \frac{6}{\log 3}$

(12.57541965 on calc)

12.575419649

5

3. The number of bacteria B in a culture increases according to the equation $B = B_0 e^{kt}$. There were 400 bacteria at time $t = 0$ and 900 bacteria at time $t = 4$ hours. Will there be 1900 bacteria after 12 hours? If not, how many will there be? No the will be

$B = 400e^{12} = 65{,}101{,}916.57$

That many?!

1/4

6

4. At the right is a "solution" to the equation $100 = 18e^{4k}$.

a. Check the answer $k \approx 0.398$ back in the equation $100 = 18e^{4k}$ and show that it doesn't work.

$100 \neq 18 = 18e^{(4)(.398)}$

$18e^{(4)(.398)} = 88.44419232$

b. Circle the error in the "solution" and give a correct solution below.

$$\frac{\ln 100}{\ln 18} = 4k$$

$$\frac{\ln 100}{4 + \ln 18} =$$

$$\frac{100}{18} = e^{4k}$$

$$\ln \frac{100}{18} = 4k$$

$k = 0.429$

$$100 = 18e^{4k}$$

$$\ln 100 = \ln\left(18e^{4k}\right)$$

$$\ln 100 = \ln 18 \ln\left(e^{4k}\right)$$

$$\frac{\ln 100}{\ln 18} = \ln\left(e^{4k}\right) =$$

$$\frac{\ln 100}{\ln 18} = 4k$$

$$\cancel{\frac{\ln 100}{4\ln 18}} = k$$

$k \approx 0.398$ X

3/4

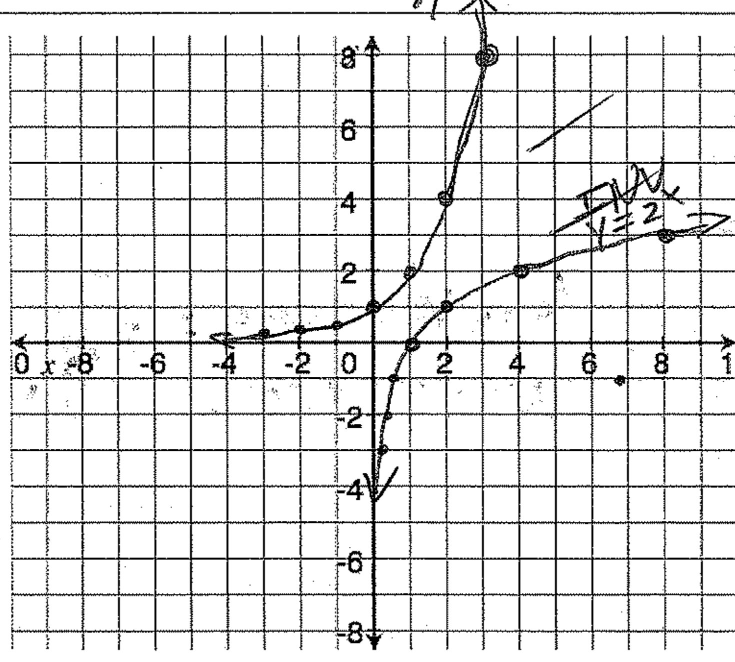
5. $\log_y 2 = x$

a. Make a table and accurately graph $y = 2^x$.

x	-3	-2	-1	0	1	2	3
y	1/8	1/4	1/2	1	2	4	8

b. Make a table of values for the inverse of $y = 2^x$.

x	1/8	1/4	1/2	1	2	4	8
y	-3	-2	-1	0	1	2	3



c. Sketch the graph of the inverse of $y = 2^x$.
(Label which graph is which.)

d. Write the equation of the inverse of $y = 2^x$ in $y =$ form.

$y = 2^x$

$x = 2^y$

$2^y = x$

$\boxed{\log_2 x = y}$

3 6. Use the properties of logs to write the expression as a sum, difference, and/or multiple of logs. <u>Simplify</u> where possible.

$\log \frac{100\sqrt{y}}{x^2} = \log 100 + \log \sqrt{y} - \log x^2$

$2 + \frac{1}{2}\log y - 2\log x$

3 7. Write the expression as the logarithm of a single quantity.

$\ln 3 + \frac{1}{3}\ln(4 - x^2) - \ln x$

$\ln \frac{3\sqrt[3]{4 - x^2}}{x}$

6 8. Molly needs to find the range of $f(x) = \frac{e^x + 7}{2}$. She has a brilliant idea that she can use the inverse of $f(x)$ in a clever way to do this. Find $f^{-1}(x)$ and use it to find the range of $f(x)$.

$y = \frac{e^x + 7}{2}$

$x = \frac{e^y + 7}{2} \times 2$

$2x = e^y + 7$

$\ln 2x = \ln e^y + \ln 7$

$\ln 2x = y + \ln 7$

$y = \ln 2x - \ln 7$

$\boxed{\text{INV } f(x) = \ln 2x - \ln 7}$

$\boxed{x \geq 3.5}$

I got it right

4 9. Select values for a and b, with $a > b$, such that $\log_b a$ is less than zero. Justify your choice for a and b.

$\log_{1/5}$

10. Solve for x.

$\log_a x + \log_a(x-2) = \log_a(x+4)$

$x + (x-2)$

$x + x - 2 = x + 4$

$2x - 2 = x + 4$

$-x \quad +2 \qquad -x \quad +2$

$x = 6$

$\boxed{x = 6}$

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

5

11. Given that $\log_a b \approx 2.3219$, approximate

a. $\log_a \frac{1}{b^2}$ b. $\log_b a$ c. $\log_a ab$

4

12. Solve for x.

$x^{\frac{3}{4}} = 8$ $\log_x 8 = 3/4$

$16^{3/4}$

2^4

$\boxed{x = 16}$

13. Suppose $g(x) = \log_7 x$ and $h(x) = 7^x$.

a. Find $g(h(x))$.

$h(x) = 7^x$

$g(h(x)) = \log_7 7^x$

$g(h(x)) = x$

b. Find $h(g(x))$.

$h(g(x)) = 7^{\log_7 x}$

$h(g(x)) = x$

7

Close!

c. What is the relationship between the functions g and h?

They both equal x So...

Bonus: Choose values for a, b, and c so that the equation below is true. Justify your choice of a, b, and c.

$\log_c[\log_a(\log_b c)] = 0$